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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/711,758	10/04/2004	Toshiharu Furukawa	BUR920040090US1	5757

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EXAMINER
DAHIMENE, MAHMOUD

ART UNIT	PAPER NUMBER
1792	

NOTIFICATION DATE	DELIVERY MODE
08/18/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/711,758	FURUKAWA ET AL.	
	Examiner	Art Unit	
	MAHMOUD DAHIMENE	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 February 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-10,12-14 and 21-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 4-10, 12-14, 21-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1, 8 and 21, and their dependent claims are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The terms "narrow section of a target shape", “wide section of a target shape” and "wide section of the follow-on mask", in the claims are indefinite because they use relative terms of degree such as “wide” and “narrow”, they do not clearly define specific dimensions. It is unclear what specific dimensions are encompassed by those terms.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1, 4-8, 12-14, and 21-23, 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gruner et al. (US 4,538,748) in view of Applicants' Admitted Prior Art.

3. Regarding claims 1, 8, 12-14, 21-22, 27, 28, Gruner discloses a thin film circuit wherein the following steps are disclosed: protecting a pair of critical edges of a hard mask (5) (column 4, line 21) on a substrate with a first portion of a second mask (90) (figure 2d) which is considered here as a "follow-on mask" since layer (90) is deposited directly on or following layer (5); forming a wide-image mask on the left and right regions (M1 and M3) (as designated in figure 2n) of the substrate proximate the hard mask with a second portion of the second mask (90), here the term wide-image mask is interpreted by the examiner in it's broader sense including "a wide-area mask, is employed to add shapes of any other, usually wider, dimensions"; removing an exposed portion of the hard mask (5); and exposing the pair of critical edges of the hard mask (figure 2i). The edges of Gruner's mask (5) must be critical since they are part of the electrical circuit. In Gruner's method, the second portion (M1 and M3) of mask (90) substantially aligns with a corresponding portion of a final shape.

It is noted that Gruner is silent about an (SIT) loop.

In the "Background Description" section on applicants' specification, applicants' disclose "SIT methods produce structures, usually hard masks, of generally closed-loop

geometry. These loops have a single, well-controlled width (referred to henceforth as the "critical image width"). Conventional SIT applications thus require the use of two additional masks. One, called a "loop cutter mask", is employed to segment the loops, and a second, called a wide-area mask, is employed to add shapes of any other, usually wider, dimensions" [Para 5].

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the process of Gruner to any substrate including a substrate comprising a STI loop.

One of ordinary skill in the art would have been motivated to apply the process of Gruner to any substrate including a substrate comprising a STI loop in order to effectively protect the edges of layers that are susceptible to damage during the subsequent processing steps as suggested by Gruner.

It is noted that Gruner is silent about the relative dimensions of a narrow section and a wide section as described in applicant's claims 1, 8 and 21, however, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Gruner to etch any shape and any size of the hardmask including the pair of critical edges of the hardmask by etching the follow-on mask to reduce the with of the first portion of the follow-on mask to laess than a critical dimensions because it appears that the device of Gruner (Fig. 2k) will still be operable when the device dimensions are reduced.

One of ordinary skill in the art would have been motivated to reduce dimensions of the device of Gruner since such a modification would have involved a mere change in

the size of a component. A change of size is generally recognized as being within the ordinary level of skill in the art.

It is also noted that Gruner is silent about “a width of the first portion of the follow-on mask exceeds the critical width by an amount of overlap, and a width of a wide section of the follow-on mask exceeds a width of a wide section of the target shape”, however applicant fails to defines the relative terms of degree such as "wide" and "narrow" in such a way as to distinguish the claimed invention from the prior art of record.

As to claim 4, in Gruner’s figure 2k, mask (91) is also considered as a follow-on mask, in Gruner’s figure 2m mask (91) is removed from the top and sides.

As to claims 5, 6, Gruner’s figure 2k, mask (91) replaces mask (90) and is aligned with the edges.

As to claim 7, masks (90) and (91) are sized to protect the critical edges.

As to claims 23-26, in the “Background Description” section on applicants' specification, applicants’ disclose “As the size of semiconductor devices has decreased, photolithographic techniques become unable to reliably create structures of the dimensions required. As photolithographic techniques have become unusable, other technologies have been developed to create the small structures required by the ever shrinking semiconductor devices. One example of a non-photolithographic imaging technique is sidewall image transfer ("SIT").” [Paragraph 4]. It is noted that in the “Background Description” section on applicants' specification, applicants’ are silent

about the exact dimensions of what is considered as the "decreased" size, it would have been obvious to one of ordinary skill in the art at the time the invention was made to understand that sub-lithographic dimensions are typically in the range of few tens of nanometer since the term few usually refers to 3-to-11, 11 tens of nanometers is 0.11 micrometers, which is in the sub-lithographic dimensions range.

Claim Rejections - 35 USC § 103

4. Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gruner et al. (US 4,538,748) in view of Applicants' Admitted Prior Art, as applied to claims 1-8 above, and further in view of Nakai et al. (US 2005/0106837).

It is noted Gruner is silent about further comprising sizing the first portion of the follow-on mask to protect the critical edges of the hard mask when the follow-on mask is mis-registered by less than a predetermined amount.

Nakai teaches a method of manufacturing a semiconductor device citing "the alignment between the third window 111a and the fourth opening 105b is eased by making the size of the third window 111a of the second photoresist pattern 111 larger than that of the fourth opening 105b of the first hard mask 105." (paragraph 0130).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Gruner to size mask (90) to account for miss-alignment errors because Nakai teaches sizing a mask is conventionally performed for mask alignment purposes.

One of ordinary skill in the art would have been motivated to size a mask for mask alignment purposes in order to avoid properly expose (or cover) the desired structures edges when mask miss-alignment is a known and quantifiable issue.

Response to Arguments

Regarding applicant's arguments about the rejection to claims 1, 8 and 21 used 35 USC § 112 second paragraph, they have been fully considered but are not persuasive because the terms "narrow" and "wide" are considered to be relative terms of degree, as such the claims fail to make clear what is encompassed by "narrow section of a target shape", "wide section of a target shape" and "wide section of the follow-on mask", is wide wither than one micron" and is narrow narrower than one meter. In addition, although the claims are read in light of the specification, limitations are not read into the claims which are not specifically recited in the claims. In this case, the claims fail to make clear what specific sizes or relationships are encompassed by the recited relative terms of "narrow section of a target shape", "wide section of a target shape" and "wide section of the follow-on mask"

As to applicants argument about the examiner not addressing the new amendments of "a width of the first portion of the follow-on mask exceeds the critical width by an amount of overlap, and a width of a wide section of the follow-on mask exceeds a width of a wide section of the target shape", as discussed above applicant

fails to defines the relative terms of degree such as "wide" and "narrow" in such a way as to distinguish the claimed invention from the prior art of record.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MAHMOUD DAHIMENE whose telephone number is (571)272-2410. The examiner can normally be reached on week days from 8:00 AM. to 5:00 PM..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. D./
Examiner, Art Unit 1792

/Nadine G Norton/
Supervisory Patent Examiner, Art Unit 1792